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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
AGRAWAL, RITESH	
ART UNIT	PAPER NUMBER
1631	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/01/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/716,330	MIYANO ET AL.	
	Examiner	Art Unit	
	Ritesh Agrawal	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2006 and 11 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) *16-17,19 and 35-44* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15,18 and 20-34* is/are rejected.

7)☒ Claim(s) *4,7 and 28* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *04/27/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Amendments

1. Applicant's election of Group I (claims 1-15, 18, and 20-34) in the reply filed on 11/14/06 is acknowledged. Furthermore, applicant's election of species E (B-splines) for the election of species requirements in the reply filed on 01/11/07 is also acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 16-17, 19, and 35-44 as well as the non-elected species for claims 3 and 21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention and species, there being no allowable generic or linking claim.

Applicants' claim amendments filed 11/14/06 and 01/11/07 are acknowledged and entered.

Priority

2. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119(e) as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional

application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosure of the prior-filed application, Application No. 60/427,448, fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. The Office is unable to find support for the methods as presently claimed. For example, with respect to claim 1, the office is unable to find support for a method that comprises quantifying an average effect and determining if one or more groups of genes is expressed differently. Furthermore, with respect to the dependent claims, the office is unable to find support for example, for the use of a backfitting algorithm or an Akaike's information criterion. Prior art published after the claimed prior application but before the filing date of the instant application may have been cited in this Office action. Applicants are requested to provide evidence that the elected invention is indeed fully disclosed in the prior application for each claim for which they wish to contest the citation of the intervening prior art.

Information Disclosure Statement

3. The Information Disclosure Statement filed 04/27/04 has been entered and considered. Initialed copies of the form PTO-1449 are enclosed with this action.

Specification

4. The disclosure is objected to because of the following:

The use of the trademarks CY3 and CY5 have been noted in this application. They should be capitalized wherever it appears and be accompanied by the generic terminology. They can be found, for example, on page 4 of the specification.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:
(1) if a machine or apparatus, its organization and operation;
(2) if an article, its method of making;
(3) if a chemical compound, its identity and use;
(4) if a mixture, its ingredients;
(5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

The abstract of the disclosure is objected to because the elected invention is drawn to a method but the abstract does not provide for the method steps. Correction is required. See MPEP § 608.01(b).

Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 1-15, 18, and 20-34 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The following analysis of facts of this particular patent application follows the analysis suggested in the "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility"[1]. Note that the text of the Guidelines is italicized.

To satisfy section 101 requirements, the claim must be for a practical application of the § 101 judicial exception, which can be identified in various ways (Guidelines, p. 19):

- The claimed invention "transforms" an article or physical object to a different state or thing.

- The claimed invention otherwise produces a useful, concrete and tangible result, based on the factors discussed below.

[1] Available at http://www.uspto.gov/web/offices/pac/dapp/opla/preognotice/guidelines101_20051026.pdf

In the instant case, the claimed invention does not "transform" an article or physical object to a different state or thing because at least one embodiment of the claimed invention merely manipulates data to develop an abstract "gene network." This does not preclude the subject matter to be patentable as, for eligibility analysis, as

> *physical transformation "is not an invariable requirement, but merely one example of how a mathematical algorithm [or law of nature] may bring about a useful application." AT&T, 172 F.3d at 1358-59, 50 USPQ2d at 1452. If the examiner determines that the claim does not entail the transformation of an article, then the examiner shall review the claim to determine if the claim provides a practical application that produces a useful, tangible and concrete result. In determining whether the claim is for a "practical application," the focus is not on whether the steps taken to achieve a particular result are useful, tangible and concrete, but rather that the final result achieved by the claimed invention is "useful, tangible and concrete." The claim must be examined to see if it includes anything more than a § 101 judicial exception. If the claim is directed to a practical application of the § 101 judicial exception producing a result tied to the physical world that does not preempt the judicial exception, then the claim meets the statutory requirement of 35 U.S.C. § 101. If the examiner does not find such a practical application, the examiner has determined that the claim is nonstatutory. (Guidelines, p. 20)*

The question is thus whether the final result achieved by the claimed invention satisfies all three criteria of being useful, and concrete, and tangible.

Furthermore, the useful, tangible, and concrete result must be recited in the claim itself, rather than addressed in specification.

(2) **"TANGIBLE RESULT"** The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. The opposite meaning of "tangible" is "abstract."

The instant claims are drawn to computational means for constructing a gene network. However, as claimed, the method does not produce a tangible result. For example, at least one embodiment of the method as claimed may take place entirely within the confines of a computer or a human mind without any communication to the outside world and without using or making available for use, the results of the computation. Thus, the instant methods of the claims do not produce any tangible result.

Therefore, the final result achieved by the claimed invention does not satisfy all three criteria of being useful, and concrete, and tangible.

Claims 31-34 are rejected because the claims are drawn to data, per se. Data is non-statutory subject matter because it represents non-functional descriptive material (see MPEP 2106.01).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-15, 18, and 20-34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the phrase "quantifying an average effect and a measure of variability of each time point on each other of said genes." While obtaining data at

various time points may show effects of genes upon each other it is unclear how a time point, per se, can cause an effect on a gene.

Claim 1 recites the limitation "each time point" in line 6. There is insufficient antecedent basis for this limitation in the claim. There is no prior reference to a "time point."

Claim 1 recites the limitation "determining if one or more groups of genes is expressed differently from other of said groups of genes" in lines 12-13. It is unclear as to what the phrase "other of said groups of genes" refers. Does one determine if one or more groups of genes is expressed differently from "another" group of genes, or from "all of the other" groups of genes?

Claim 2 extends the method of claim 1 by "providing a Bayesian computational model." It is unclear as to how this helps achieve the goal of claim 1, which is to construct a gene network and how this is used in the construction thereof.

Claim 4 recites the phrase "using time course study to alter gene expression." As with claim 1, while obtaining time course data may help detect alterations in gene expression, it is unclear as to how time course data, per se, can alter gene expression.

Claim 8 recites the phrase "said genes are associated with a cell cycle." It is unclear as to which genes the claim refers. Does it refer to the "set of genes", the "other" genes, etc.? Since in the art there is only a single cell cycle, it is unclear as to whether the claim limitation "a cell cycle" refers to this cell cycle or some other cell cycle.

Claim 12 recites the phrase "implementing one or more of add, remove, and reverse" in step (2). As there is no prior reference to these actions in the claim or the claims from which it is dependent, it is unclear what is being acted upon, i.e. what is added, remove, or reversed.

Claim 14 recites the limitation "an intensity of the edge is determined using a bootstrap method" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. There is no prior reference to "an edge" in claim 14 or the claims from which it depends.

Claim 15 recites the limitation "estimating the genetic network" in step (2). There is insufficient antecedent basis for this limitation in the claim. It is unclear as to whether a "genetic network" is the same as a "gene network."

Claim 18 recites the limitation "said step of grouping" in line 1. There is insufficient antecedent basis for this limitation in the claim. There is no "grouping" step in claim 1. There is a step for determining if groups of genes are differently expressed, which utilizes "groups" but there is no "grouping step", per se.

Claim 20 recites a method for constructing a gene network but fails to provide active steps that achieve this goal.

Claim 27 recites the phrase "implementing one or more of add, remove, and reverse" in step (2). As there is no prior reference to these actions in the claim or the claims from which it is dependent, it is unclear what is being acted upon, i.e. what is added, remove, or reversed.

Claim 29 recites the limitation "an intensity of the edge is determined using a bootstrap method" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. There is no prior reference to "an edge" in claim 29 or the claims from which it depends.

Claim 30 recites the limitation "estimating the genetic network" in step (2). There is insufficient antecedent basis for this limitation in the claim. It is unclear as to whether a "genetic network" is the same as a "gene network."

The term "remote" in claim 33 is a relative term which renders the claim indefinite. The term "remote" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The use of the term makes indefinite the location from which the data file is accessible.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 20, 21-23, and 25 are rejected under 35 U.S.C. 102(a,b) as being anticipated by Imoto et al. (Pacific Symposium on Biocomputing, pages 175-186, 2002).

The claims are drawn to a method of constructing a gene network model using time course gene expression data and a Bayesian model which minimizes a BNRC criterion.

Imoto et al. disclose using time course gene expression data (page 182, 2nd paragraph), producing a genetic network (for example, abstract), and using a Bayesian model which minimizes a BNRC criterion (Imoto et al., page 178, "the optimal graph is chosen . . .").

With respect to claim 21, Imoto et al. disclose using linear curve fitting using B-splines (page 179, 5th paragraph).

With respect to claim 22, Imoto et al. disclose using a backfitting algorithm (page 181, 1st paragraph).

With respect to claim 23, Imoto et al. disclose using Akake's information criterion (page 182, 1st paragraph, lines 4-5).

With respect to claim 25, Imoto et al. disclose using a non-parametric method (for example, abstract, line 2).

8. Claims 1, 4, 8, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Friedman et al. (Journal of Computational Biology, Vol. 7, Pages 601-620, 2000).

The claims are drawn to a method for constructing a gene network comprising:

(a) providing a quantitative time course data library wherein said library includes expression results for a set of genes, quantifying average effects and variability at each measured time point of genes on each of the other genes

(b) creating a gene expression matrix from the data library

(c) generating network relationships

(d) determining if genes are differently expressed

Friedman provides time course data from yeast experiments (page 610, 6th paragraph, lines 1-3). They disclose that they are quantifying averaged effects and variability (page 613, 4th paragraph, lines 3-4). They generate a matrix from the library (for example, see page 603, 7th paragraph, "table that specifies . . ."), generate network relationships (for example, abstract, lines 4-6) and determine if genes are differently expressed (page 610, 6th paragraph, lines 3-4).

With respect to claim 4, Friedman et al. disclose using time course data wherein gene expression is altered through the use of different cell cycle synchronization methods (page 610, 6th paragraph, lines 2-3).

With respect to claim 8, since the measured genes are affected by methods of cell cycle synchronization, they are in some way associated with the cell cycle.

With respect to claim 18, Friedman et al. disclose the use of equivalence sets (for example, page 604, 4th paragraph).

9. Claims 1-15, 18, and 20-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Imoto et al. (U.S. Patent Publication # 2003/0219764) filed September 26th, 2002.

The applied reference has a common inventor and assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

The claims are drawn to a method of constructing a gene network comprising:

(a) providing quantitative time course data

(b) creating a gene expression matrix

(c) generating network relationships

(d) determining if one or more genes is expressed differently

Imoto et al. disclose the claim limitations (see Imoto et al., claim 1).

With respect to claim 2, Imoto et al. disclose the claim limitations (see claim 2).

With respect to claim 3, Imoto et al. disclose the claim limitations (see claim 3).

With respect to claim 4, given the indefiniteness of the claim (as addressed above), the claim is being interpreted to mean that the data library is created using time course data wherein the data is obtained from conditions where the gene expression is altered. As such, Imoto et al. disclose such a condition (see claim 4).

With respect to claim 5, Imoto et al. disclose using a backfitting algorithm (claim 5).

With respect to claim 6, Imoto et al. disclose using Akaike's information criterion (claim 6).

With respect to claim 7, Imoto et al. disclose using maximum likelihood estimation (claim 7).

With respect to claim 8, Imoto et al. disclose using genes associated with a cell cycle (claim 8).

With respect to claim 9, Imoto et al. disclose the measure of variability as variance (claim 9).

With respect to claim 10, Imoto et al. disclose using a non-parametric method (claim 10).

With respect to claim 11, Imoto et al. disclose using heterogeneous error variances (claim 11).

With respect to claim 12, Imoto et al. disclose the additional steps (claim 12).

With respect to claim 13, Imoto et al. disclose applying hill-climbing (claim 13).

With respect to claim 14, Imoto et al. disclose using a bootstrap method (claim 14).

With respect to claim 15, Imoto et al. disclose the additional steps (claim 15).

With respect to claim 18, Imoto et al. disclose using equivalence sets (claim 18).

Claim 20 is generic to claim 2 and is disclosed in claim 20 of Imoto et al.

Claim 21 is generic to claim 3 and is disclosed in claim 21 of Imoto et al.

Claim 22 is generic to claim 5 and is disclosed in claim 22 of Imoto et al.

Claim 23 is generic to claim 6 and is disclosed in claim 23 of Imoto et al.

Claim 24 is generic to claim 7, and is disclosed in claim 24 of Imoto et al.

Claim 25 is generic to claim 10, and is disclosed in claim 25 of Imoto et al.

Claim 26 is generic to claim 11, and is disclosed in claim 26 of Imoto et al.

Claim 27 is generic to claim 12, and is disclosed in claim 27 of Imoto et al.

Claim 28 is generic to claim 13, and is disclosed in claim 28 of Imoto et al.

Claim 29 is generic to claim 14, and is disclosed in claim 29 of Imoto et al.

Claim 30 is generic to claim 15, and is disclosed in claim 30 of Imoto et al.

Claims 31-34 are drawn to data files as disclosed in claims 45-48 of Imoto et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 2-3, 5-6, and 9-10, are rejected under 35 U.S.C. 103(a) as being unpatentable over Friedman et al. (Journal of Computational Biology, Vol. 7, Pages 601-620, 2000) as applied to claims 1, 4, 8, and 18 above, and further in view of Imoto et al. (Pacific Symposium on Biocomputing, pages 175-186, 2002).

The claims are drawn to the method of claim 1 with the additional limitations stemming from the use of a BNRC criterion.

Friedman et al. disclose the method of claim 1 (as cited above) but do not disclose these additional limitations in combination with a BNRC criterion.

Imoto et al. disclose these additional limitations.

It would have been obvious to one of ordinary skill in the art to combine the method of Friedman et al. with that of Imoto et al. One of ordinary skill in the art would have been motivated to do this because the method of Imoto et al. is more effective than the previous methods (abstract, lines 5-7) because of its inclusion of the consideration of non-linear dependencies over just the consideration of linear

dependencies by previous methods (page 175, 2nd paragraph, lines 13-14 through 3rd paragraph, lines 1-4).

With respect to claim 2, Imoto et al. disclose using a Bayesian model minimizing a BNRC criterion (Imoto et al., page 178, "the optimal graph is chosen . . .").

With respect to claim 3, Imoto et al. disclose the use of B-splines (page 179, 5th paragraph).

With respect to claim 5, Imoto et al. disclose using a backfitting algorithm (page 181, 1st paragraph).

With respect to claim 6, Imoto et al. disclose using the Akaike's information criterion (page 182, 1st paragraph, lines 4-5).

With respect to claim 9, Friedman et al. disclose variance as a measure of variability (page 613, 4th paragraph, lines 3-4).

With respect to claim 10, Imoto et al. disclose the use of non-parametric curve fitting (for example, abstract, line 2).

11. Claims 2-3, 7, 10-13, 20-21, and 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Friedman et al. (Journal of Computational Biology, Vol. 7, Pages 601-620, 2000) as applied to claims 1, 4, 8, and 18 above, and further in view of Imoto et al. (Proceedings of the IEEE Computer Society Bioinformatics Conference, pages 219-227, 2002).

The claims are drawn to the method of claim 1, with additional limitations based upon the use of a BNRC criterion.

Friedman et al. disclose the method of claim 1 (as cited above) but do not disclose these additional limitations in combination with a BNRC criterion.

Imoto et al. disclose these additional limitations.

It would have been obvious for one of ordinary skill in the art, at the time the invention was made, to combine the method of Friedman et al. with the method of Imoto et al. One of ordinary skill in the art would have been motivated to do so because the nonparametric method of Imoto et al. improves the ability to determine causality and directionality relationships in gene networks (see Imoto et al., page 220, 2nd column, 3rd paragraph, lines 1-4).

With respect to claim 2, Imoto et al. disclose using a BNRC criterion (for example, see page 222, 1st column, 1st paragraph).

With respect to claim 3, Imoto et al. disclose using B-splines for non-linear curve-fitting (for example, page 222, 2nd column, 2nd paragraph).

With respect to claim 7, Imoto et al. disclose using a maximum likelihood estimate (page 224, 1st column, 3rd paragraph, lines 17-18).

With respect to claim 10, Imoto et al. disclose using a non-linear curve fitting method (page 220, 2nd column, 1st paragraph).

With respect to claim 11, Imoto et al. disclose using heterogeneous error variances (page 220, 2nd column, 1st paragraph).

With respect to claim 12, Imoto et al. disclose the additional steps for minimizing BNRC (page 223, 2nd column, 1st paragraph).

With respect to claim 13, Imoto et al. disclose using a hill-climbing algorithm (page 223, 2nd column, 1st paragraph).

With respect to claim 20, it is generic to claim 2. Therefore, given the obviousness of claim 2, claim 20 is obvious as well.

With respect to claim 21, it is generic to claim 3. Therefore, given the obviousness of claim 3, claim 21 is obvious as well.

With respect to claim 24, it is generic to claim 7. Given the obviousness of claim 7, claim 24 is obvious as well.

With respect to claim 25, it is generic to claim 10. Given the obviousness of claim 10, claim 25 is obvious as well.

With respect to claim 26, it is generic to claim 11. Given the obviousness of claim 11, claim 26 is obvious as well.

With respect to claim 27, it is generic to claim 12. Given the obviousness of claim 12, claim 27 is obvious as well.

With respect to claim 28, it is generic to claim 13. Given the obviousness of claim 13, claim 28 is obvious as well.

Claim Objections

12. Claim 4 is objected to because of the following informalities:

Claim 4 recites the phrase "using time course study to alter gene expression." There appears to be a missing "a" between "using" and "time."

Claim 7 is objected to because of the following informalities:

Claim 7 recites the phrase "a BNRC criterion further comprising using maximum likelihood estimation." It appears that the term "comprising" should be replaced with the term "comprises."

Claim 28 is objected to because of the following informalities:

Claim 28 recites the phrase "algorithm to minimize BNRC." It appears that there is a missing "the" between minimize and BNRC.

Appropriate correction is required.

Conclusion

13. No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ritesh Agrawal whose telephone number is (571) 272-2906. The examiner can normally be reached on 8:30 AM - 5:00 PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Wang can be reached on 571-272-0811. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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